

Microsoft Excel 2010- Illustrated

Unit B:

Working with Formulas and Functions

Objectives

- Create a complex formula
- Insert a function
- Type a function
- Copy and move cell entries
- Understand relative and absolute cell references

Objectives

- Copy formulas with relative cell references
- Copy formulas with absolute cell references
- Round a value with a function

Creating a Complex Formula

- A **complex formula** is an equation that uses more than one type of arithmetic operator
 - Example: formula that uses both addition and multiplication
 - Arithmetic operations are performed according to the order of precedence

Creating a Complex Formula

Formula containing multiple arithmetic operators

The screenshot shows the Microsoft Excel 2010 interface. The title bar reads "EX-B-Tour Expense Analysis.xlsx - Microsoft Excel". The ribbon includes tabs for File, Home, Insert, Page Layout, Formulas, Data, Review, and View. The Formulas tab is active, showing the Formula Bar with the formula $=B12+B12*2$. The worksheet contains a table of tour expenses by quarter for FY 2013. Cell B14 is highlighted, showing the formula $=B12+B12*2$. A red arrow points from the text "Complex formula" to cell B14. Another red arrow points from the text "Mode indicator" to the formula bar.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Australia	5367.4	5800.49	6583.12	6133.14	
Britain	3510.99	3921.46	4337.4	4558.11	
Canada	4287.76	4371.98	4570.21	4100.06	
France	4032.1	4489.74	4575.06	4653.92	
Germany	5082.77	2994.56	3561.12	3712.5	
India	1468.25	2510.3	2665.04	2890.95	
Japan	3271.5	3556.14	8240.35	3721.69	
U.S.A.	7195.06	6542.76	8240.36	7018.91	
Total	34215.83	34247.43	42776.66	36789.28	
20% rise	$=B12+B12*2$				
Average					
Maximum					
Minimum					

Complex
formula

Mode
indicator

Creating a Complex Formula

- Order of precedence in Excel formulas
 - Operations inside parentheses are calculated first
 - Exponents are calculated next
 - Multiplication and division are calculated next (from left to right)
 - Addition and subtraction are calculated next (from left to right)

Inserting a Function

- A **function** is a predefined worksheet formula that makes it easy to perform a complex calculation
 - Can be used by itself or within a formula
 - If used alone, begins with the formula prefix (=)

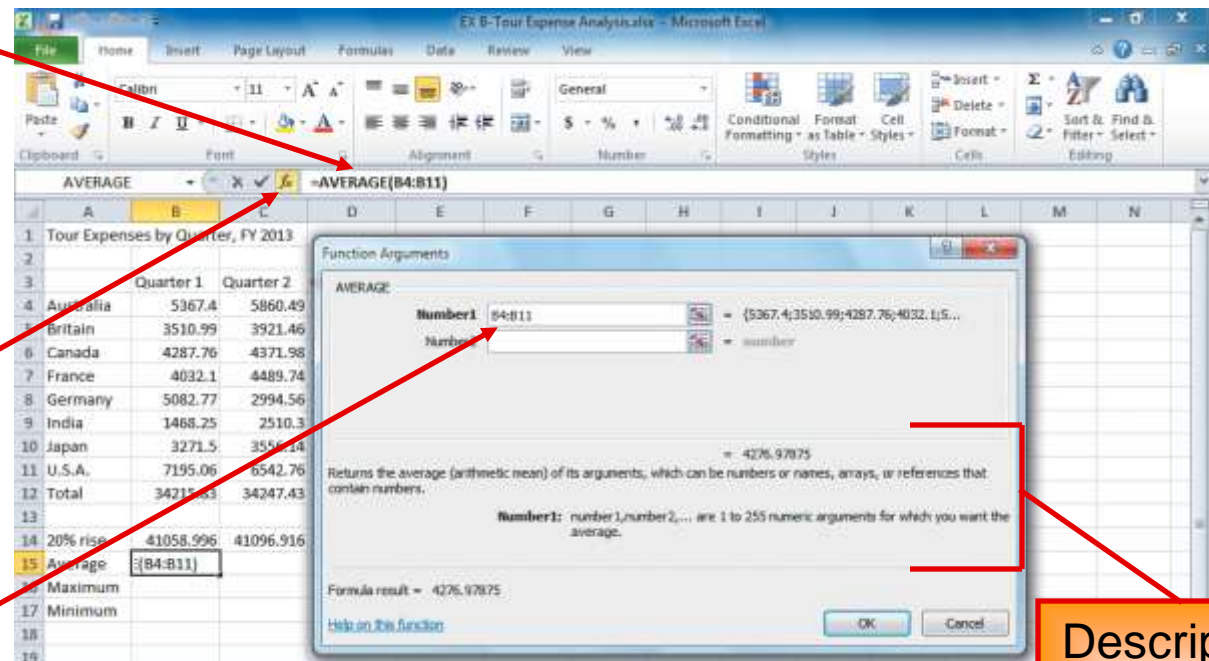
Inserting a Function

Expanded Function Arguments dialog box

Function

Insert
Function
button

Argument



Description
and
argument
format

Typing a Function

- A function can be typed **manually** into a cell
 - You must know the name and initial characters of the function
 - Can be faster than using the **Insert Function** dialog box
 - Experienced Excel users often prefer this method

Typing a Function

- While manually typing a function, it is necessary to begin with the equal sign (=)
- Once you type an equal sign, each letter you type activates the AutoComplete feature

Typing a Function

MAX function in progress

13						
14	20% rise	41058.996	41096.916	51331.992	44147.136	
15	Average	4276.97875	4280.92875	5347.0825	4598.66	
16	Maximum	=MAX(
17	Minimum	MAX(number1, [number2], ...)				
18						

Copying and Moving Cell Entries

- You can copy or move data within a worksheet or between worksheets using:
 - Cut, Copy, and Paste buttons
 - Fill handle in the lower-right corner of the active cell
 - Drag-and-drop feature
- Office Clipboard temporarily stores information that you copy or cut

Copying and Moving Cell Entries

- Pasting an item from the Clipboard
 - Only need to specify the upper-left cell of the range where you want to paste the selection

Copying and Moving Cell Entries

EX B-Tour Expense Analysis.xlsx - Microsoft Excel

Copied data in Office Clipboard

Paste button

Copy button

Clipboard launcher

Item in Clipboard

Quarter 1

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
1	Tour Expenses by Quarter, FY 2013				
2					
3	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
4	Australia	5367.4	5860.49	6583.12	6133.14
5	Britain	3510.99	3921.46	4337.4	4558.11
6	Canada	4287.76	4371.98	4570.21	4100.06
7	France	4032.1	4489.74	4579.06	4653.92
8	Germany	5082.77	2994.56	3561.12	3712.5
9	India	1468.25	2510.3	2665.04	2890.95
10	Japan	3271.5	3556.14	8240.35	3721.69
11	U.S.A.	7195.06	6542.76	8240.36	7018.91
12	Total	34215.83	34247.43	42776.66	36789.28
13					
14	20% rise	41058.996	41096.916	51331.992	44147.136
15	Average	4276.97875	4280.92875	5347.0825	4598.66
16	Maximum	7195.06	6542.76	8240.36	7018.91
17	Minimum	1468.25	2510.3	2665.04	2890.95
18					
19	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
20					
21					

Clipboard (Ctrl)

Understanding Relative and Absolute Cell References

- Use a **relative cell reference** when you want to preserve the relationship to the formula location
 - Calculations are performed based on cell relationship
 - When a formula is copied, the cell reference changes to preserve the relationship of the formula to the referenced cells
 - The Excel default

Understanding Relative and Absolute Cell References

Formulas containing relative references

Formula
containing relative
references

Expense Projections.xlsx - Microsoft Excel

Formula Bar: =SUM(B5:E5)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Australia	5,400	5,800	5,900	6,100	\$ 23,200
Britain	3,700	4,700	4,500	4,600	\$ 17,500
Canada	4,500	4,400	4,600	4,600	\$ 18,100
France	4,200	4,500	4,600	4,700	\$ 18,000
Germany	3,100	3,000	3,600	3,800	\$ 13,500
India	1,600	2,500	2,600	2,900	\$ 9,600
Japan	3,300	3,600	3,600	3,800	\$ 14,300
U.S.A.	7,200	6,600	8,300	7,100	\$ 29,200
Total	\$ 33,000	\$ 35,100	\$ 37,700	\$ 37,600	\$ 105,800

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Australia	8,100	8,700	8,850	9,150	\$ 34,800
Britain	5,550	7,050	6,750	6,900	\$ 26,250
Canada	6,750	6,600	6,900	6,900	\$ 27,150
France	6,300	6,750	6,900	7,050	\$ 27,000
Germany	4,650	4,500	5,400	5,700	\$ 20,250
India	2,400	3,750	3,900	4,350	\$ 14,400
Japan	4,950	5,400	5,400	5,700	\$ 21,450
U.S.A.	10,800	9,900	12,450	10,650	\$ 43,800
Total	\$ 49,500	\$ 52,650	\$ 56,550	\$ 56,400	\$ 215,100

Understanding Relative and Absolute Cell References

- Use an **absolute cell reference** when you want to preserve the exact cell address in a formula
 - Reference does not change even if the formula is copied to another location
 - Created by placing a dollar sign (\$) before both the column letter and the row number for the cell's address

Understanding Relative and Absolute Cell References

Formulas containing absolute and relative references

Relative references adjust

Absolute references do not adjust

Cell referenced in absolute formulas

Expense Projections.xlsx - Microsoft Excel

Formulas containing absolute and relative references

Formula Bar: `=SUM(B5:E5)`

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
	5000	5800	5900	6100	<code>=SUM(B5:E5)</code>
Canada	4500	4700	4500	4600	<code>=SUM(B6:E6)</code>
France	4200	4400	4600	4600	<code>=SUM(B7:E7)</code>
Germany	3100	4500	4600	4700	<code>=SUM(B8:E8)</code>
India	1600	3600	3600	3800	<code>=SUM(B9:E9)</code>
Japan	3300	2500	2600	2900	<code>=SUM(B10:E10)</code>
U.S.A.	7200	3600	3600	3800	<code>=SUM(B11:E11)</code>
		6600	8300	7100	<code>=SUM(B12:E12)</code>
Total	<code>=SUM(B5:B12)</code>	<code>=SUM(C5:C12)</code>	<code>=SUM(D5:D12)</code>	<code>=SUM(E5:E12)</code>	<code>=SUM(B13:D13)</code>

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
	<code>=C5*\$B\$16</code>	<code>=D5*\$B\$16</code>	<code>=E5*\$B\$16</code>	<code>=F5*\$B\$16</code>	<code>=SUM(B19:E19)</code>
	<code>=C6*\$B\$16</code>	<code>=D6*\$B\$16</code>	<code>=E6*\$B\$16</code>	<code>=F6*\$B\$16</code>	<code>=SUM(B20:E20)</code>
	<code>=C7*\$B\$16</code>	<code>=D7*\$B\$16</code>	<code>=E7*\$B\$16</code>	<code>=F7*\$B\$16</code>	<code>=SUM(B21:E21)</code>
	<code>=C8*\$B\$16</code>	<code>=D8*\$B\$16</code>	<code>=E8*\$B\$16</code>	<code>=F8*\$B\$16</code>	<code>=SUM(B22:E22)</code>
	<code>=C9*\$B\$16</code>	<code>=D9*\$B\$16</code>	<code>=E9*\$B\$16</code>	<code>=F9*\$B\$16</code>	<code>=SUM(B23:E23)</code>
	<code>=C10*\$B\$16</code>	<code>=D10*\$B\$16</code>	<code>=E10*\$B\$16</code>	<code>=F10*\$B\$16</code>	<code>=SUM(B24:E24)</code>
Japan	<code>=B11*\$B\$16</code>	<code>=C11*\$B\$16</code>	<code>=D11*\$B\$16</code>	<code>=E11*\$B\$16</code>	<code>=SUM(B25:E25)</code>
U.S.A.	<code>=B12*\$B\$16</code>	<code>=C12*\$B\$16</code>	<code>=D12*\$B\$16</code>	<code>=E12*\$B\$16</code>	<code>=SUM(B26:E26)</code>
Total	<code>=SUM(B19:B26)</code>	<code>=SUM(C19:C26)</code>	<code>=SUM(D19:D26)</code>	<code>=SUM(E19:E26)</code>	<code>=SUM(F19:F26)</code>

Understanding Relative and Absolute Cell References

- Using a mixed reference
 - A **mixed cell reference** combines both relative and absolute cell referencing
 - Example: When you copy a formula, you may want to change the row reference but keep the column reference

Copying Formulas with Relative Cell References

- Reuse formulas you have created
 - Use Copy and Paste commands or the fill handle to copy formulas
 - Copying a formula to a new cell
 - Excel substitutes new cell references so that the relationship of the cells to the formula remains unchanged

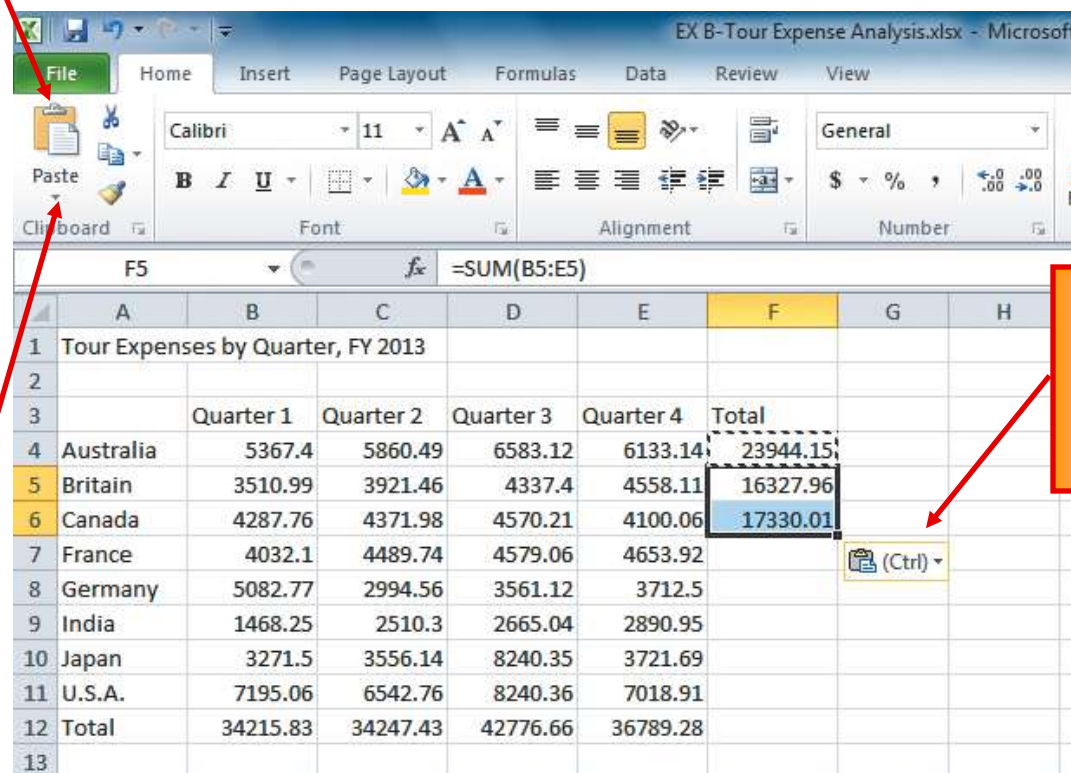
Copying Formulas with Relative Cell References

Formula pasted in a range

Paste
button

Paste
button list
arrow

Paste
Options
button



EX B-Tour Expense Analysis.xlsx - Microsoft

File Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number

Paste

F5 =SUM(B5:E5)

	A	B	C	D	E	F	G	H
1	Tour Expenses by Quarter, FY 2013							
2								
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total		
4	Australia	5367.4	5860.49	6583.12	6133.14	23944.15		
5	Britain	3510.99	3921.46	4337.4	4558.11	16327.96		
6	Canada	4287.76	4371.98	4570.21	4100.06	17330.01		
7	France	4032.1	4489.74	4579.06	4653.92			
8	Germany	5082.77	2994.56	3561.12	3712.5			
9	India	1468.25	2510.3	2665.04	2890.95			
10	Japan	3271.5	3556.14	8240.35	3721.69			
11	U.S.A.	7195.06	6542.76	8240.36	7018.91			
12	Total	34215.83	34247.43	42776.66	36789.28			
13								

(Ctrl)

Copying Formulas with Relative Cell References

- Auto Fill feature can be used for filling cells with sequential text or values
 - Months of the year; days of the week; or text plus a number (Quarter 1, Quarter 2, etc.)
 - Drag the fill handle to extend an existing sequence

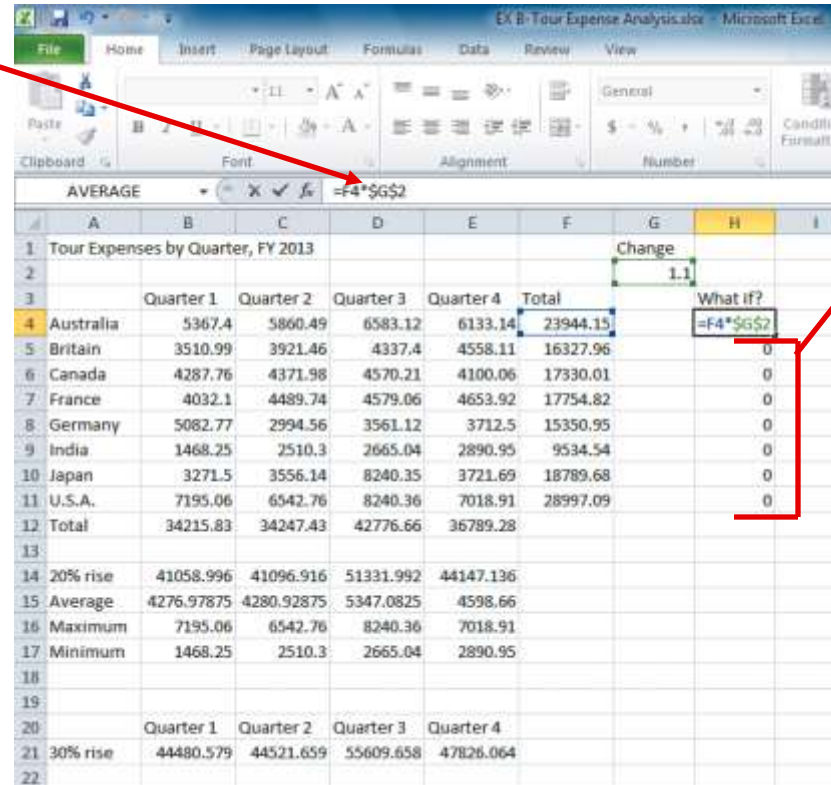
Copying Formulas with Absolute Cell References

- Apply **absolute** cell reference before copying a formula if you want one or more cell references to remain unchanged in relation to the formula

Copying Formulas with Absolute Cell References

Absolute reference created in formula

Absolute cell reference in formula



EX B: Tour Expense Analysis.xlsx - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Conditional Formulas

AVERAGE X ✓ f_x

=F4*\$G\$2

	A	B	C	D	E	F	G	H	I
1	Tour Expenses by Quarter, FY 2013						Change		
2							1.1		
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total		What if?	
4	Australia	5367.4	5860.49	6583.12	6133.14	23944.15		=F4*\$G\$2	
5	Britain	3510.99	3921.46	4337.4	4558.11	16327.96		0	
6	Canada	4287.76	4371.98	4570.21	4100.06	17330.01		0	
7	France	4032.1	4489.74	4579.06	4653.92	17754.82		0	
8	Germany	5082.77	2994.56	3561.12	3712.5	15350.95		0	
9	India	1468.25	2510.3	2665.04	2890.95	9534.54		0	
10	Japan	3271.5	3556.14	8240.35	3721.69	18789.68		0	
11	U.S.A.	7195.06	6542.76	8240.36	7018.91	28997.09		0	
12	Total	34215.83	34247.43	42776.66	36789.28				
13									
14	20% rise	41058.996	41096.916	51331.992	44147.136				
15	Average	4276.97875	4280.92875	5347.0825	4598.66				
16	Maximum	7195.06	6542.76	8240.36	7018.91				
17	Minimum	1468.25	2510.3	2665.04	2890.95				
18									
19									
20		Quarter 1	Quarter 2	Quarter 3	Quarter 4				
21	30% rise	44480.579	44521.659	55609.658	47826.064				
22									

Incorrect values from relative referencing in copied formulas

Rounding a Value with a Function

- Cells containing financial data are often easier to read if they contain fewer **decimals**
 - Use the **ROUND** function to round down your results

Rounding a Value with a Function

ROUND function added to an existing formula

ROUND
function and
opening
parenthesis
inserted in
formula

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total	Change	What if?
1 Tour Expenses by Quarter, FY 2013						1.2	
2							
3							
4 Australia	5367.4	5860.49	6583.12	6133.14	23944.15		20732.98
5 Britain	3510.99	3921.46	4337.4	4558.11	16327.96		15593.55
6 Canada	4287.76	4371.98	4570.21	4100.06	17330.01		20796.01
7 France	4032.1	4489.74	4579.06	4653.92	17754.82		21305.78
8 Germany	5082.77	2994.56	3561.12	3712.5	15350.95		18421.14
9 India	1468.25	2510.3	2665.04	2890.95	9534.54		11441.45
10 Japan	3271.5	3556.14	8240.35	3721.69	18789.68		22547.62
11 U.S.A.	7195.06	6542.76	8240.36	7018.91	28997.09		34796.51
12 Total	34215.83	34247.43	42776.66	36789.28			
13							
14 20% rise	=ROUND(B1	41096.916	51331.992	44147.136			
15 Average	4276.97875	4280.92875	5347.0825	4598.66			
16 Maximum	7195.06	6542.76	8240.36	7018.91			
17 Minimum	1468.25	2510.3	2665.04	2890.95			
18							
19							
20	Quarter 1	Quarter 2	Quarter 3	Quarter 4			
21 30% rise	44480.579	44521.659	55609.658	47826.064			
22							

ScreenTip
indicates what
information is
needed

Summary

- Create a complex formula
- Insert a function
- Type a function
- Copy and move cell entries
- Understand relative and absolute cell references

Summary

- Copy formulas with relative cell references
- Copy formulas with absolute cell references
- Round a value with a function